



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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Decision Rationale
Total Maximum Daily Loads (TMDLs) for
Bacteria and Nutrient Impairments on the
Mispillion River and Cedar Creek Watersheds,
Kent and Sussex Counties, Delaware

Signed

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Date:12/14/2006



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I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by a state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited waterbody.

This document will set forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDLs for the bacteria and nutrient impairments on the Mispillion River and Cedar Creek Watersheds. EPA's rationale is based on the determination that the TMDLs meet the following eight regulatory conditions pursuant to 40 CFR §130.

- 1) The TMDLs are designed to implement applicable water quality standards.
- 2) The TMDLs include a total allowable load as well as individual waste load allocations (WLAs) and load allocations (LAs).
- 3) The TMDLs consider the impacts of background pollutant contributions.
- 4) The TMDLs consider critical environmental conditions.
- 5) The TMDLs consider seasonal environmental variations.
- 6) The TMDLs include a MOS.
- 7) There is reasonable assurance that the TMDLs can be met.
- 8) The TMDLs have been subject to public participation.

II. Background

The Mispillion River Watershed forms the border between Kent and Sussex Counties in Southern Delaware. The Cedar Creek Watershed which is just south of the Mispillion River is located in northern Sussex County, Delaware. Both of these watersheds are tributaries to Delaware Bay. The impaired segments are all listed from their headwaters to their mouths which is its confluence with the Delaware River. The watersheds are approximately 76 and 52 square miles in size, respectively. Croplands and wetlands comprise at least 65 percent of the area of each watershed. Additional land use data can be found in Table 2.4 of the TMDL Report.

In response to Section 303(d) of the CWA, the Delaware Department of Natural Resources and Environmental Control (DNREC) listed the Mispillion River (DE210-001 through 005 and L01 through L06) and Cedar Creek (DE080-001 through 003), on its 1996 Section 303(d) list as being unable to attain the criterion or guidance thresholds for dissolved

oxygen (DO), nutrients and/or bacteria. This decision rationale will address the TMDLs for the bacteria and nutrient (DO) impairments.

The bacteria impairment in these watersheds is based on elevated levels of enterococcus detected in the water column. The State of Delaware's criteria for enterococcus is a geometric mean not to exceed 100 colony forming units (cfu)/100 milliliters (ml) and a single sample maximum not to exceed 185 cfu/100 ml. For marine waters the geometric mean concentration is 35 cfu/100 ml and the single sample maximum is 104 cfu/100 ml. The concentration of enterococcus in these waters exceeded the applicable criteria and they were therefore listed as not supporting the primary contact usage. Table 1 documents the TMDL loading for the bacteria TMDLs.

The nutrient TMDLs for the impaired waters demonstrate that the current nutrient loadings do not support DNREC's screening thresholds. In 1996, the State of Delaware listed each of these waters for low DO levels and elevated nutrient levels in water column samples collected during the assessment period. The findings were confirmed in later water column samples collected by the state. Waters found to be impaired are then targeted for a more intensive study, as part of the TMDL, which includes additional water quality monitoring and modeling. During the TMDL phase, the nutrient loading to the impaired waters was modeled to determine if a DO impairment was evidenced. If a DO impairment is not observed, the water is determined not to have a nutrient impairment. The nitrogen and phosphorous concentrations observed in the impaired waters from 2002 through 2003 were above the upper bounds of the state's screening concentrations (3 mg/l and 0.2 mg/l respectively) and found to impact the DO concentrations negatively. The TMDL analysis found that reductions in nutrients were required to attain the DO criteria on the impaired waters. Table 1 identifies the nutrient loadings to the Mispillion River and Cedar Creek Watersheds Tables 5.3 through 5.6 of the TMDL report provide this information based on each impaired segment.

Table 1 - Summarizes the Specific Elements of the TMDLs in Daily Loads.

Stream Name	Pollutant	TMDL	WLA	LA	MOS
Mispillion River	Nitrogen	757 lbs	0.0	757lbs	Implicit
Mispillion River	Phosphorous	13.25 lbs	0.0	13.25 lbs	Implicit
Mispillion River	Enterococcus	2.92E+11 cfu	0.0	2.92E+11 cfu	Implicit
Cedar Creek	Nitrogen	587 lbs	0.0	587 lbs	Implicit
Cedar Creek	Phosphorous	23 lbs	0.0	23 lbs	Implicit
Cedar Creek	Enterococcus	1.08E+11	0.0	1.08E+11	Implicit

The United States Fish and Wildlife Service and the National Marine Fisheries Service have been provided with copies of the TMDLs.

III. Discussion of Regulatory Conditions

EPA finds that Delaware has provided sufficient information to meet all of the eight basic requirements for establishing TMDLs for bacteriological and nutrient impairments on the impaired waters. EPA is therefore approving these TMDLs. EPA's approval is outlined according to the regulatory requirements listed below.

1) The TMDLs are designed to meet the applicable water quality standards.

Delaware has indicated that excessive levels of enterococcus due to nonpoint sources have caused violations of the water quality criteria and designated uses on the impaired waters. The water quality criterion for enterococcus is a geometric mean 100 cfu/100ml or an instantaneous standard of no more than 185 cfu/100ml. For marine waters the geometric mean concentration is 35 cfu/100 ml and the single sample maximum is 104 cfu/100 ml. The applicable water quality criterion for DO is an instantaneous minimum concentration of 4.0 mg/l and a daily average concentration no less than 5.5 mg/l. Delaware does not have state adopted criterion for either nitrogen or phosphorous, but uses threshold concentrations of 3.0 mg/l and 0.2 mg/l for nitrogen and phosphorous respectively. Water quality data collected by the state found violations of the DO criteria and nutrient thresholds.

The watershed was modeled using the Loading Simulation Program C++ (LSPC) and the Environmental Fluid Dynamics Code (EFDC) to develop a simulation of the loading, flow and in stream processes associated with the Mispillion River and Cedar Creek. The LSPC model simulates watershed hydrology, bacteria and nutrient accumulation and washoff on land, as well as flow, bacteria, nutrient and DO concentrations in streams. The LSPC simulation is applied directly to the EFDC model. These two models were then able to simulate the processes impacting the nutrient, DO and bacteria concentrations within the system. The models were first calibrated to observed data collected from the Mispillion River and Cedar Creek. During this phase parameters were adjusted to get as close of a fit as possible to observed conditions. Once this process was completed the model was run against a different set of data and all of the parameters were held constant. This demonstrates whether the model is accurately reflecting stream process. After this process, the loads can be manipulated to determine a loading scenario that will allow for the attainment of criteria.

2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

Total Allowable Loads

Delaware indicates that the total allowable loading is the sum of the loads allocated to land based precipitation driven nonpoint source areas and point sources. The total allowable load is calculated on a daily basis.

Waste Load Allocations

EPA regulations require that an approvable TMDL include individual WLAs for each

point source. According to 40 CFR § 122.44(d)(1)(vii)(B), “Effluent limits developed to protect a narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR § 130.7.” Furthermore, EPA has authority to object to the issuance of any National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with the WLAs established for that point source.

Delaware has stated that there are two regulated point sources discharging to the Mispillion River. One of the facilities (Baltimore Aircoil Milford Plant, DE0051047) does not discharge the pollutants of concern and the other facility (Sea Watch International, DE0051098) has a stormwater permit not covered under either phase 1 or 2 and therefore does not require a WLA.

Load Allocations

Gross LAs were established for each of the impaired segments. The total loading for each water was placed in the LA since there were no allocations to point sources. Table 5-3 through 5-6 provide the reader with the baseline load, TMDL load and percent reduction for each segment.

3) The TMDLs consider the impacts of background pollution.

The TMDLs consider the impact of background pollutants by considering the bacteria and nutrient loads from all sources and calibrating to observed data which naturally includes background loads.

4) The TMDLs consider critical environmental conditions.

According to EPA's regulation 40 CFR § 130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the impaired waters is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards¹. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable “worst-case” scenario condition. For example, stream analysis often uses a low-flow

¹EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

(7Q10) design condition because the ability of the waterbody to assimilate pollutants without exhibiting adverse impacts is at a minimum. The TMDL was developed based on data collected in 2002 and 2003. These are dry and wet years, respectively. Therefore, the TMDL considers critical dry and wet weather conditions.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow and loadings as a result of hydrologic and climatological patterns. In the continental United States, seasonally high flows normally occur in early spring from snow melt and spring rain, while seasonally low flows typically occur during the warmer summer and early fall drought periods. The TMDL models considered seasonal variation by capturing all four seasons in both a dry and wet year.

6) The TMDLs include a margin of safety.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL. Delaware included an implicit MOS in the TMDL through the use of conservative modeling assumptions.

7) There is a reasonable assurance that the TMDLs can be met.

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR § 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs can be implemented through a number of existing programs such as Section 319 of the CWA, commonly referred to as the Nonpoint Source Program. As stated in the bacteria TMDL, the state anticipates the adoption of a pollution control strategy for the impaired waterbodies that will work to ensure the implementation of the TMDL.

8) The TMDLs have been subject to public participation.

Two forums were held for the public to comment on these TMDLs. A public workshop was held on May 18, 2006, that allowed the public to engage with DNREC representatives on the TMDLs' development and findings. A public hearing was held on August 22, 2006, which provided the public with the opportunity to comment on the TMDL. The workshop and hearing were noticed in local and regional newspapers.